A PRELIMINARY STATEMENT CONCERNING MOSSES COMMON TO JAPAN AND MEXICO[1]

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Since it has been noted that certain genera and species of plants were common to Mexico and Asia by Matuda (1953) and Sharp (1953, 1965), it was felt that a preliminary study of mosses common to Japan and Mexico might be informative. It is interesting that identical species in the two areas are present in several categories of plants, e.g., *Mitchella repens* and *Phryma leptostachya* in the angiosperms; *Brothera leana* and *Homaliadelphus sharpii* (cf. Iwatsuki, 1958) among the mosses; *Cladonia formosana* among the lichens (Evans, 1955).

We are fortunate in having the preliminary list of mosses of Japan and its adjacent areas by Noguchi (1959) and also a preliminary list of Mexican mosses presented by Crum (1951). Although these are being modified by monographic and other studies, such as that of Robinson (1964), the changes are less at the generic level than among the species.

The moss floras of these two widely-separated areas have a total of over 300 genera in them, which at present are thought to represent over 2000 species. Of these more than one-third of the genera occur in both areas and include about 1500 species. About 150 other genera with over 300 species are present in Japan but not in Mexico. Conversely about 75 genera representing about 150 species are indigenous to Mexico but not to Japan.

It might be of interest to note the genera which have species common to the two countries. In all cases infraspecific names are ignored.

Sphagnum has about 50 species in Japan and 5 in Mexico with *S. meridense* (*S. platyphyllum*), *S. palustre,* and *S. subsecundum* common to both.

Andreaea with 4 species in Japan has 2 in Mexico with *A. rupestris* present in both.

Fissidens has 50 species in Japan and 32 in Mexico of which *F. cristatus, F. garberi,* and *F. grandifrons* are reported in both regions.

Garckea phascoides, found in Japan and Mexico, is of interest because of its apparently disjunctive range in America.

Ceratodon has *C. purpureus* in Japan and Mexico with 1 other species in the latter area.

Distichium is represented by *D. capillaceum* in both countries with another species in Japan.

Bryoxiphium norvegicum is present in both areas and is of unusual interest (cf. Löve & Löve, 1953).

Trematodon, with 5 species in Japan and 3 in Mexico, has *T. longicollis* common to both.

Aongstroemia has 5 species in Mexico and 1 (*A. orientalis*) in Japan which is present in the two regions.

Thysanomitrium richardi in Japan and Mexico is the sole representative of the genus in these areas.

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Dicranodontium exhibits 5 species in Japan of which *D. denudatum* is the only species known in Mexico.

Paraleucobryum is represented by 2 species in Japan of which *P. enerve* is the only taxon reported from Mexico.

Brothera leana is the only species found in Japan and in Mexico.

Dicranum, well-developed in Japan (20 species), has only 7 in Mexico; *D. flagellare* and *D. scoparium* are in both.

Encalypta has 3 species in Japan of which *E. ciliata* is the only species known from Mexico.

Anoectangium, with 11 species in Japan and 8 in Mexico, exhibits only *A. compactum* in both countries.

Merceya has 2 species in Japan of which *M. ligulata* is found also in Mexico.

Weissia is represented by 8 species in Japan of which *W. controversa* is the only species in the genus in Mexico.

Gymnostomum, with 4 species in Japan, is represented by *G. calcareum* (common to both) in Mexico.

Hymenostylium recurvirostrum is the single species of the genus found in Japan and in Mexico.

Eucladium verticillatum is the only representative of this genus in Japan and in Mexico.

Trichostomum, with 7 species in Japan and 6 in Mexico, has only *T. brachydontium* common to both lists.

Timmiella anomala alone represents this genus in both areas, and is of interest because of its more disjunctive range in America.

Tortella, with 8 species in Japan and 3 in Mexico, has *T. humilis* (*T. caespitosa*) indigenous to both.

Didymodon, better represented in Mexico (13 species) than in Japan (6), has only *D. recurvirostrum* in both areas.

Barbula, with 30 species in Mexico and 11 in Japan, has *B. ehrenbergiana* and *B. convoluta* in both.

Tortula, better represented in Mexico (19 species) than in Japan (9), has only *T. ruralis* common to both.

Grimmia, more diversified in Japan (about 30 species) than in Mexico (about 15), has *G. alpicola, G. apocarpa, G. montana, G. ovalis, G. patens,* and *G. pulvinata* in both countries.

Venturiella sinensis, indigenous to Japan, is found in Texas just north of Mexico and probably occurs in the latter country; its distribution is very interesting.

Funaria, with 6 species in Japan and 7 in Mexico, has the cosmopolitan *F. hygrometrica* in both.

Pohlia, better represented in Japan (with about 30 species) and with 12 reported from Mexico, has *P. cruda, P. flexuosa* (*P. tenuiseta*), and *P. wahlenbergii* common to both areas.

Anomobryum filiforme is the only species of the genus in Japan and is among the 4 species reported from Mexico.

Leptobryum has 2 species in Japan, one of which (*L. pyriforme*) is also found in Mexico.

Bryum, with about 30 species in Japan and 25 in Mexico, has *B. argenteum, B. bicolor, B. caespiticium, B. capillare, B. coronatum,* and *B. truncorum* in both countries.

Rhodobryum roseum is the only species of the genus in both areas but Mexico has 2, and Japan 1 other species.

Mnium is represented in Mexico only by *M. rostratum, M. marginatum,* and *M. orthorrhynchum,* all of which are among the 50 species listed for Japan.

Rhizogonium has only *R. spiniforme* in Mexico but it and 4 other species are indigenous in Japan.

Aulacomnium palustre is found in Mexico, and it and 3 more species are reported from Japan.

Bartramia, with 3 species in Japan and 3 in Mexico, has only *B. ithyphylla* common to both.

Philonotis, with about the same number of species reported in Japan (10) as in Mexico (11), has only *P. fontana* in both lists.

Hedwigia with *H. ciliata* common to both countries has an additional species in Mexico.

Forsstroemia (*Leptodon*) has 4 species in Japan of which *F. trichomitria* also occurs in Mexico.

Barbella pendula is indigenous to both areas with 2 additional species in Japan and 2, in Mexico.

Homaliadelphus sharpii is found in both countries with 2 other species in Japan.

Haplohymenium triste is common to the two regions with 3 additional species in Japan.

Anomodon is represented in Mexico by 4 species two of which (*A. minor* and *A. viticulosus*) are among the 8 present in Japan.

Herpetineuron toccoae is the only species in the genus indigenous to Japan and to Mexico.

Haplocladium microphyllum is reported from both countries but Japan has 8 other species.

Thuidium, better represented in Japan (about 35 species) than in Mexico (6), has only *T. delicatulum* common to both.

Campylium has 3 "common" species: *C. chrysophyllum*, *C. hispidulum*, and *C. stellatum*, with a total of 7 in Japan and 4 in Mexico.

Leptodictyum, with 5 species in Japan and 3 in Mexico, has only *L. riparium* common to both lists.

Hygroamblystegium has only *H. tenax* among the 4 species reported from Japan and the 2, from Mexico.

Amblystegium serpens represents the genus in both countries, which has 10 species in Japan and 3 in Mexico.

Drepanocladus has 9 species in Japan and 3 in Mexico, of which *D. exannulatus* and *D. uncinatus* are found in both regions.

Platyhypnidium riparioides is the only species in Japan, and it and 2 others are reported from Mexico.

Brachythecium salebrosum is the single species of the genus in both areas—Mexico has about 20 species and Japan 38.

Eurhynchium has 12 species in Japan, of which 2, *E. praelongum* and *E. pulchellum*, are the only species of the genus in Mexico.

Pterigynandrum filiforme is the only representative of the genus in Japan and in Mexico.

Plagiothecium denticulatum is the only Mexican representative of the genus; it is among the ± 15 species in Japan.

Heterophyllium affine (*H. nemorosum*) is the only Mexican species of the genus which is represented in Japan by it and 4 other species.

Hypnum, a relatively large genus in Japan (about 20 species) but with only 8 in Mexico, has only *H. cupressiforme* in both.

Rhytidium rugosum represents the genus in both areas.

Diphyscium foliosum is the only species common to Mexico and Japan—the latter has a total of 5 species.

Oligotrichum aligerum is found in Mexico and in Japan which has 2 additional species of the genus.

Polytrichum is represented by 3 species in Mexico: *P. commune*, *P. formosum*, and *P. juniperinum*, all of which are among the 10 reported from Japan.

Thus it appears there are 65 genera with about 93 species which have been reported from both Japan and Mexico. Of these species, several might be considered more or less cosmopolitan with little geographical significance, *e.g.*, *Ceratodon purpureus*, *Weissia controversa*, *Funaria hygrometrica*, *Bryum argenteum*. Others present ranges of unusual interest, *e.g.*, *Fissidens garberi*, *Aongstroemia orientalis*, *Brothera leana*, *Symblepharis helicophylla*, *Venturiella sinensis*, *Homaliadelphus*

sharpii, Heterophyllium affine, inter alia. Certain related, or vicariad, or perhaps conspecific taxa, *e.g., Hypnodontopsis apiculata* and *H. mexicana, Pogonatum spinulosum* and *P. pensilvanicum, Entodon angustifolius* and *E. macropodus*, and *Trachypodopsis crispatula* and *T. otiophylla* present ranges that are extremely interesting. The ranges of many taxa need to be studied further before their geographical significance can be determined. Moreover, additional monographic work may well increase the number of species common to both Japan and Mexico.

Of interest too, are certain species reported from Guatemala by Bartram (1949), which are common to Japan but unreported from Mexico (although most are present north of Mexico). These include *Trichostomum cyclindricum, Barbula reflexa, Orthotrichum anomalum, Hookeria acutifolia, Cratoneuron filicinum*, and *Hylocomium brevirostre.* They should be searched for in Mexico, but if they are absent, their disjunctive ranges would be particularly intriguing.

It is clear that the Japanese moss flora is richer than that of Mexico. If we ignore those common to both countries, Japan has about twice as many genera as does Mexico and well over twice as many species. In the genera common to both areas, the Japanese species far outnumber the Mexican. While further study, particularly monographic work, may reduce the number of taxa, the disparity between the moss floras of Japan and of Mexico will remain, even if somewhat diminished.

This disparity in the richness in the two floras may be due in part to the geological histories of the two regions, and in part to the present environments. According to Schuchert (1935) Mexico was relatively low (and probably tropical) almost until the Pliocene, and at present a large part of that country is too arid for the development of a bryophytic flora comparable to that of Japan. In contrast, the geological history of Japan and its present environments are such as to facilitate the development and retention of an extremely rich bryoflora.

Although this is only a preliminary statement, it does suggest that there are common to Japan and to Mexico certain species with disjunctive ranges which require studies and explanations.

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